



Earth Venture Mission – 3
Technical, Management, and Cost Evaluation
Pre-Proposal Web Conference

Announcement of Opportunity NNH21ZDA0020,
December 17, 2020



Outline

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Introduction

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Purpose of this Presentation

1. Present a short overview of the Technical, Management and Cost (TMC) Evaluation of proposals submitted as a result of the Earth Venture Mission - 3 (EVM-3) Announcement of Opportunity (AO).
2. Discuss some EVM-3 AO highlights
3. Point to reference documents
4. Answer questions

Important Note: Proposers must read the AO carefully, and all proposals must comply with the requirements and constraints contained in the AO.



EVM-3 AO



EVM-3 AO

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Introduction

Investigations proposed in response to this solicitation must,

- support the goals and objectives of EVM-3 (Section 2)
- be implemented by Principal Investigator (PI) led investigation teams (Section 5.4.1)
- be implemented through the provision of complete spaceflight missions (Section 5.3.1)

Proposed investigations will be evaluated and selected through a single-step competitive process (Section 7).

- The single-step competitive process entails the solicitation, submission, evaluation, and selection of proposals prepared in response to this AO.
- NASA intends to select one investigation for funding through all Phases (A-F) of mission development for flight and operations.



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PI-Managed Mission Cost and Cost Reserves (Section 5.7)

The PI-Managed Mission Cost (PIMMC), including all mission phases is capped at the AO Cost Cap of \$190M FY 2022 dollars, or an Adjusted AO Cost Cap as applicable for the proposed mission (e.g., missions proposing AO-provided access to space).

Requirement 63. Proposals shall include the proposed PIMMC and the proposed Total Mission Cost in all required AO cost tables (see Appendix B, Section H).

Requirement 64. The proposed costs shall comply with the AO Cost Cap or specify and comply with the Adjusted AO Cost Cap, as applicable.

Requirement 65. No more than 25% of the PIMMC shall be incurred prior to KDP-C (Confirmation).

Requirement 68. Proposals shall identify and justify the adequacy of the proposed cost reserves. Proposals shall include a minimum of 25% of unencumbered cost reserves against the cost to complete Phases A/B/C/D and shall demonstrate an approach to maintaining at least the required unencumbered cost reserves through subsequent development phases.



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Mission Category and Payload Risk Classification (Section 4.1.4)

The NASA Science Mission Directorate (SMD) had determined that the EVM-3 mission to be selected as a result of this AO to be a Category 3 project (per NPR 7120.5E) with Class D payloads (per NPR 8705.4), with a prime mission life of less than 3 years. Proposers must incorporate appropriate work effort and support in their proposals accordingly.



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Access to Space (Sections 5.10.3 - 5.10.4)

- The EVM-3 AO includes AO-provided Access to Space (Section 5.10.3).
- The cost of all standard AO-Provided Access to Space is to be reflected as a reduction in the Adjusted AO Cost Cap (Section 5.10.3).
- Allows for Alternative Access to Space (Section 5.10.4).



TMC Evaluation



TMC Evaluation

Evaluation Criteria

Evaluation Criteria (Section 7.2):

1. Scientific Merit of the Proposed Investigation (Section 7.2.2)
2. Scientific Implementation Merit and Feasibility of the Proposed Investigation (Section 7.2.3)
- 3. TMC Feasibility of the Proposed Mission Implementation (Section 7.2.4)**

Weighting: the first criterion is weighted approximately 40%; the second and third criteria are weighted approximately 30% each.

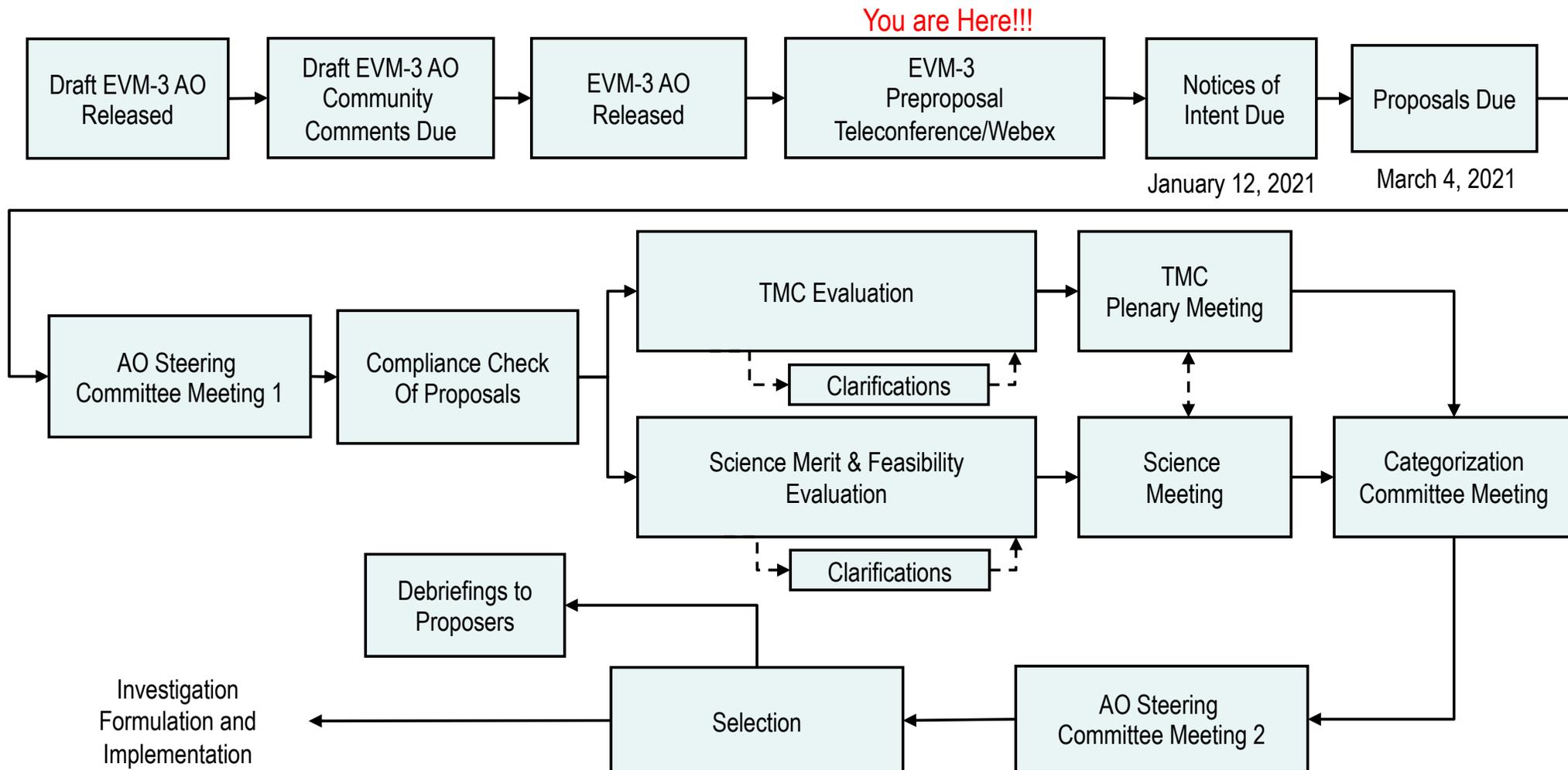
TMC Evaluation: The technical and management approaches of all submitted investigations are evaluated to assess the likelihood that they can be successfully implemented as proposed, including an assessment of the likelihood of their completion within the proposed cost and schedule.



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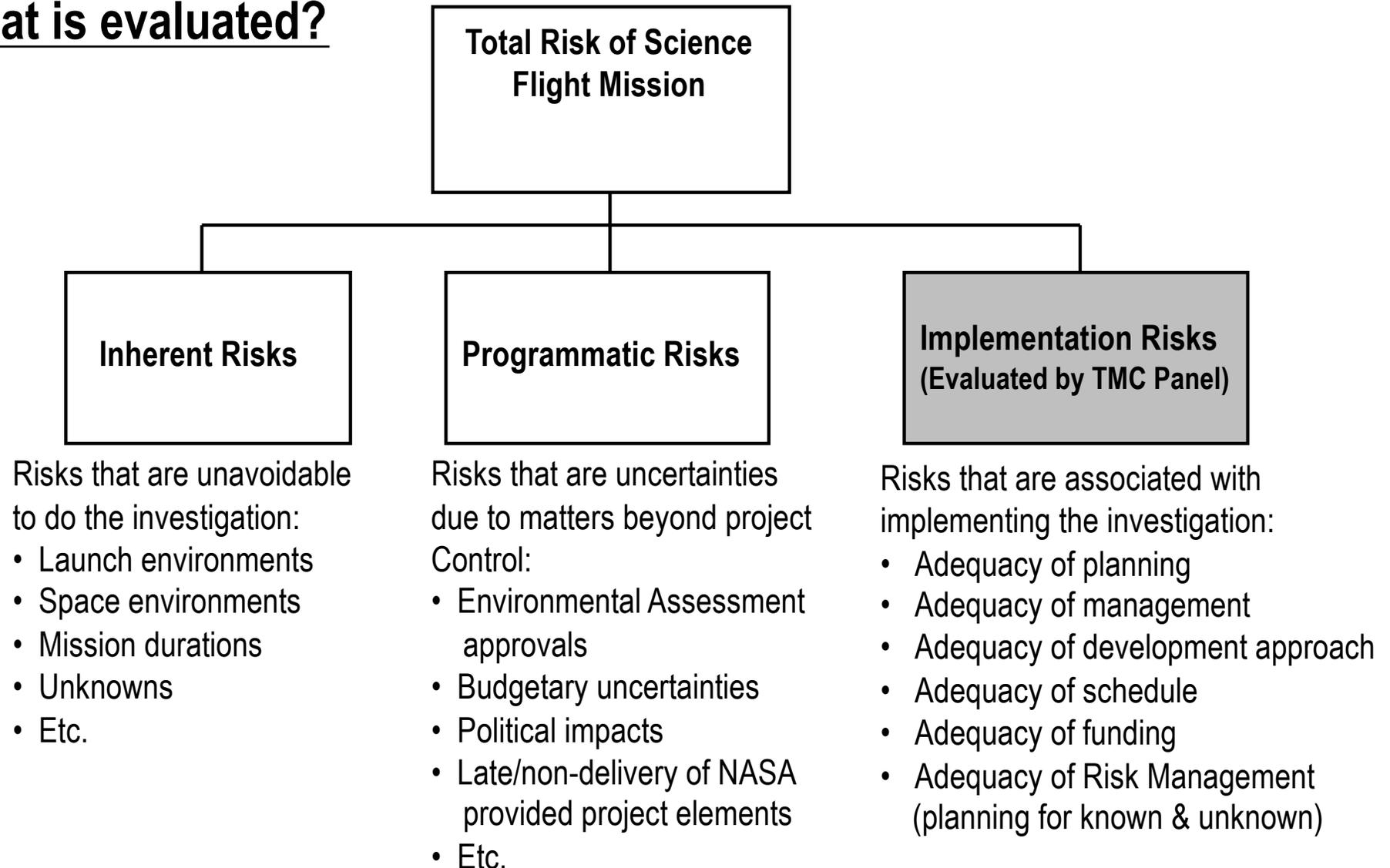
EVM-3 AO Solicitation, Evaluation and Selection Flow





TMC Evaluation

What is evaluated?





TMC Evaluation

TMC Evaluation Purpose and Principles (1 of 2)

TMC evaluation purpose: to assess the likelihood that the submitted investigations' technical and management approaches can be successfully implemented as proposed, including an assessment of the likelihood of their completion within the proposed cost and schedule.

- Basic Principles:
 - It is assumed that the proposer is the expert on his/her proposal.
 - Proposer's task is to demonstrate that the investigation implementation risk is low.
 - TMC panel's task is to try to validate proposer's assertion of low risk.
- Merit is to be assessed on the basis of material in the proposal and the clarifications. All Proposals are evaluated to identical standards and not compared to other proposals.
- TMC Panels consist of evaluators who are experts in the factors that they evaluate.



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TMC Evaluation Purpose and Principles (2 of 2)

- TMC Panels develop findings for each proposal - Findings: “As expected” (no finding), “above expectations” (strengths), “below expectations” (weaknesses). Risk Ratings should reflect the written strengths and weaknesses.
- The Cost Analysis is integrated into overall Risk Rating.
- Proposal Risk Assessment: Proposals are based on Pre-Phase-A concepts; TMC Risk Assessments give appropriate benefit of the doubt to the Proposer.



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TMC Evaluation Factors; Section 7.2.4 of the EVM-3 AO

TMC Feasibility of the Proposed Mission Implementation

Factor C-1. Adequacy and robustness of the instrument implementation plan.

Factor C-2. Adequacy and robustness of the mission design and plan for mission operations.

Factor C-3. Adequacy and robustness of the flight systems.

Factor C-4. Adequacy and robustness of the management approach and schedule, including the capability of the management team.

Factor C-5. Adequacy and robustness of the cost plan, including cost feasibility and cost risk.



TMC Evaluation

TMC Evaluation Findings Definitions

Major and minor strengths and weaknesses are defined as follows:

Major Strength: A facet of the implementation response that is judged to be well above expectations and can substantially contribute to the ability of the project to meet its technical requirements on schedule and within cost.

Minor Strength: A strength that is worthy of note and can be brought to the attention of Proposers during debriefings, but is not a discriminator in the assessment of risk.

Major Weakness: A deficiency or set of deficiencies taken together that are judged to substantially weaken the project's ability to meet its technical objectives on schedule and within cost.

Minor Weakness: A weakness that is sufficiently worrisome to note and can be brought to the attention of Proposers during debriefings, but is not a discriminator in the assessment of risk.

Note: Findings that are considered "as expected" are not documented in the Form C.



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TMC Evaluation Panel Other Considerations

The panel evaluating the “TMC Feasibility of the Proposed Mission Implementation” may provide comments to NASA regarding the feasibility of the proposed access to space. While these comments are not considered in the evaluation, they may be considered during selection.

Programmatic risks may be assessed but are not included in the TMC risk rating. Examples include but are not limited to: stability and reliability of proposed partners and their contributions, and environmental assessment approvals.

Student Collaboration proposals, if any, are evaluated only for the impact they have on overall TMC mission feasibility to the extent that they are not separable; Student Collaboration proposals are not penalized for any inherent higher cost, schedule, or technical risk, as long as the Student Collaboration is shown to be clearly separable from the implementation of the Baseline Science Mission.

The panel evaluating the “TMC Feasibility of the Proposed Mission Implementation” will provide comments to NASA regarding the extent to which the proposed investigation provides career development opportunities to train the next generation of engineering and management leaders. While these comments will not be considered in the evaluation, they may be considered during selection.



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TMC Evaluation Cost Analysis

- Initial cost analyses are accomplished on the basis of information provided in the proposals (e.g., consistency, completeness, basis of estimate, contributions, use of full cost accounting, maintenance of reserve levels, cost management).
- One or more cost models are utilized to validate the proposed cost.
- Implementation threats are identified.
- Cost threat impacts to the proposed unencumbered reserves are assessed (refer to TMC Cost Threat Matrix in next slide). For Phases A-D, the remaining unencumbered reserves are compared to the minimum required in the AO. The AO does not specify a minimum unencumbered cost reserves for Phases E/F.
- The entire panel participates in Cost deliberations. All information from the entire evaluation process is considered in the final cost assessment.
- Cost findings are documented under the Cost Factor on the Form C.
- The panel is polled for Cost Risk Rating.



TMC Evaluation

TMC Evaluation Cost Analysis: Cost Threat Matrix

The *likelihood* and *cost impact*, if any, of each weakness is stated as “This finding represents a cost threat assessed to have an Unlikely/Possible/Likely/Very Likely/Almost Certain likelihood of a Very Minimal/Minimal/Limited/ Moderate/Significant/Very Significant cost impact being realized during development and/or operations, which results in a reduction from the proposed unencumbered reserves.”

- The *likelihood* is the probability range that the cost impact will materialize.
- The *cost impact* is the current best estimate of the range of costs to mitigate the threat.

The cost threat matrix defines the adjectives that describe the *likelihood* and *cost impact*.

The minimum cost threat threshold is \$1M.

		Cost Impact (CI) % of PI-Managed Mission Cost to complete Phases B/C/D or % of Phase E not including unencumbered cost reserves or contributions					
		Very Minimal	Minimal	Limited	Moderate	Significant	Very Significant
		0.5% < CI ≤ 2.5% (\$0M < CI ≤ \$0M) 1% < CI ≤ 2.5% (\$0M < CI ≤ \$0M)	2.5% < CI ≤ 5% (\$0M < CI ≤ \$0M) 2.5% < CI ≤ 5% (\$0M < CI ≤ \$0M)	5% < CI ≤ 10% (\$0M < CI ≤ \$0M) 5% < CI ≤ 10% (\$0M < CI ≤ \$0M)	10% < CI ≤ 15% (\$0M < CI ≤ \$0M) 10% < CI ≤ 15% (\$0M < CI ≤ \$0M)	15% < CI ≤ 20% (\$0M < CI ≤ \$0M) 15% < CI ≤ 20% (\$0M < CI ≤ \$0M)	CI > 20% (CI > \$0M) CI > 20% (CI > \$0M)
Likelihood (L, %)	Likelihood of Occurrence	Weakness					
	Almost Certain (L > 80%)						
	Very Likely (60% < L ≤ 80%)						
	Likely (40% < L ≤ 60%)						
	Possible (20% < L ≤ 40%)						
Unlikely (L ≤ 20%)							

Note: Each “\$0M” is converted to dollars according to the associated percentage depending on the proposed PIMMC.



TMC Evaluation

TMC Evaluation Cost Analysis: Cost Risk Definitions (1 of 4)

The three criteria below are indicators of Cost Risk. Evaluators must consider these criteria and other relevant information (e.g., cost model applicability, uncertainty of the cost models error bars, effect of cost issues that fall below the minimum cost threat threshold, likelihood of cost impacts, mitigating factors such as major strengths, etc.) together with their judgement in determining the appropriate Cost Risk for a particular investigation.

Three criteria are considered for the determination of the Cost Risk for a proposed investigation; 1) The level of unencumbered reserves after any reduction by TMC identified cost threats; 2) The comparison of proposed cost with the TMC Base Independent Cost Estimate considering the appropriate error bars; and 3) The proposed cost, including reserves, supported by material in the proposal.

Appropriate Cost Reserves are defined as the minimum unencumbered reserves required by the Announcement of Opportunity (AO), or higher as judged by the TMC evaluation panel based on the justification provided by the PI (Principal Investigator). Unencumbered cost reserves higher than the minimum AO requirement may be necessary for some investigations, such as those requiring specific technology maturation.



TMC Evaluation

TMC Evaluation Cost Analysis: Cost Risk Definitions (2 of 4)

Low Risk

- No cost threats have been identified by the TMC evaluation panel that reduce the proposed unencumbered cost reserves below the Appropriate Cost Reserves.
- The proposed investigation cost and the cost of all modelled lower Work Breakdown Structure (WBS) levels are greater than or equal to the lower bounds of the TMC Base Independent Cost Estimate error bars.
- The proposed investigation cost estimate is very well supported by the information in the proposal.

Low/Medium Risk

- No cost threats have been identified by the TMC evaluation panel that reduce the proposed unencumbered cost reserves below the Appropriate Cost Reserves.
- The proposed investigation cost and the cost of most modelled lower WBS levels are greater than or equal to the lower bounds of the TMC Base Independent Cost Estimate error bars.
- The proposed investigation cost estimate is well supported by the information in the proposal.



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TMC Evaluation Cost Analysis: Cost Risk Definitions (3 of 4)

Medium Risk

- Cost threats have been identified by the TMC evaluation panel that reduce the proposed unencumbered cost reserves below the Appropriate Cost Reserves.
- The proposed investigation cost or the cost of most modelled lower WBS levels are greater than or equal to the lower bounds of the TMC Base Independent Cost Estimate error bars.
- The proposed investigation cost estimate is mostly supported by the information in the proposal.

Medium/High Risk

- Cost threats have been identified by the TMC evaluation panel that reduce the proposed unencumbered cost reserves below the Appropriate Cost Reserves.
- The proposed investigation cost or the cost of most modelled lower WBS levels are lower than the lower bounds of the TMC Base Independent Cost Estimate error bars.
- The proposed investigation cost estimate is not well supported by the information in the proposal.



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TMC Evaluation Cost Analysis: Cost Risk Definitions (4 of 4)

High Risk

- Cost threats have been identified by the TMC evaluation panel that reduce the proposed unencumbered cost reserves significantly below the Appropriate Cost Reserves.
- The proposed investigation cost and the cost of most modelled lower WBS levels are significantly lower than the lower bounds of the TMC Base Independent Cost Estimate error bars.
- The proposed investigation cost estimate is not supported by the information in the proposal.



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PMWs Clarification Process: Modified from Previous AOs

Section 7.1.1 of the EVM-3 AO states that “Proposers should be aware that, during the evaluation and selection process, NASA may request clarification of specific points in a proposal; if so, such a request from NASA and the proposer’s response must be in writing. ... Proposers will be allowed up to six pages (with some restrictions) for clarifications of PMWs associated with the Scientific Implementation Merit and Feasibility of the Proposed Investigation evaluation criterion and **up to six pages (with some restrictions) for clarifications of PMWs associated with the TMC Feasibility of the Proposed Mission Implementation evaluation criterion.** These clarifications may include text, tables and figures to address the PMWs and to provide additional information.”

Please note that the Potential Major Weaknesses (PMWs) clarification process is a significant modification from the process previously utilized for AO Step 1 or Single-Step evaluations.



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PMWs Clarification Process: Requirements (1 of 2)

Clarifications Responses must conform to the following requirements:

Requirement 1: Proposers shall submit only one Clarification Response Document per criteria , i.e., one for Scientific Implementation Merit and Feasibility of the Proposed Investigation and one for the TMC Feasibility of the Proposed Mission Implementation.

Requirement 2: The Clarification Response Document shall be a single unlocked (e.g., without digital signatures) searchable Adobe Portable Document Format (PDF) file, composed of the response text, figures, and/or tables. Images (e.g., figures and scans) shall be converted into machine-encoded text using optical character recognition. Animations shall not be included. Links to materials outside of the response are not permitted. Do not insert any comment fields.

Requirement 3: The Clarification Response Document shall be presented in 8.5 x 11 inch paper (or A4). Text shall not exceed 5.5 lines per vertical inch and page numbers shall be specified. Margins at the top, both sides, and bottom of each page shall be no less than 1 inch if formatted for 8.5 x 11 inch paper; no less than 2.5 cm at the top and both sides, and 4 cm at the bottom if formatted for A4 paper. Type fonts for text, tables, and figure captions shall be no smaller than 12-point (i.e., no more than 15 characters per horizontal inch; six characters per horizontal centimeter). Fonts used within figures shall be no smaller than 8-point.



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PMWs Clarification Process: Requirements (2 of 2)

Requirement 4: The Clarification Response Document shall not exceed a total of six pages per criteria , i.e., six for Scientific Implementation Merit and Feasibility of the Proposed Investigation, and six for the TMC Feasibility of the Proposed Mission Implementation. Text, table(s) and figure(s) are permitted, however all material shall be within the six page limit per criteria and limitations in Requirement 3.

Requirement 5: The Clarification Response Document shall not contain International Traffic in Arms Regulations (ITAR), Export Administration Regulations (EAR), or classified material.

Requirement 6: Each PMW shall be addressed and each clarification response labelled with the PMW number provided. Each PMW clarification response shall only contain information relevant to the PMW.

Requirement 7: The proposers are free to provide any additional information on any criteria or requirements relevant to the proposed mission, e.g., for TMC Feasibility of the Proposed Investigation Implementation, advances in proposed technologies since proposal submission. However, this response together with the PMW clarification responses shall fulfill requirements above and not exceed the six total page limitation per Clarification Response Document.

Requirement 8: In support of each PMW clarification response, proposers shall not provide more than two references; references are restricted to peer reviewed literature. In support of any additional information response, proposers shall not provide more than three additional references; references are restricted to peer reviewed literature. Proposers shall not provide URLs with any of the responses.



TMC Evaluation

TMC Risk Ratings

TMC Evaluation: to assess the likelihood that the submitted investigations' technical and management approaches can be successfully implemented as proposed, including an assessment of the likelihood of their completion within the proposed cost and schedule.

Based on the narrative findings, each proposal is assigned one of three risk ratings, defined as follows:

- **LOW Risk:** There are no problems evident in the proposal that cannot be normally solved within the time and cost proposed. Problems are not of sufficient magnitude to doubt the proposer's capability to accomplish the investigation well within the available resources.
- **MEDIUM Risk:** Problems have been identified, but are considered within the proposal team's capabilities to correct within available resources with good management and application of effective engineering resources. Investigation design may be complex and resources tight.
- **HIGH Risk:** One or more problems are of sufficient magnitude and complexity as to be deemed unsolvable within the available resources.

Note: Only Major Findings are considered in the risk rating.



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EVM-3 Acquisition Homepage

The EVM-3 Acquisition Homepage is found at <https://essp.larc.nasa.gov/EVM-3/>

EVM-3 Library

Reference documents are available at https://essp.larc.nasa.gov/EVM-3/evm-3_library.html

Program Specific Documents

[ESSP Program Plan](#)

[Science Mission Directorate Standard MAR Payload Classification: D](#) (updated 9/18/2020)

[ELV Launch Services Program Information Summary](#) (updated 10/5/2020)

[Commercial FAA-Licensed Launch Services Program Information Summary](#) (updated 10/5/2020)

[ESPA Secondary Payloads Rideshare SMD Policy Document](#) (SPD-32 Rev 1)

[NASA Science Mission Directorate \(SMD\) Launch Vehicle Secondary Payload Adapter Rideshare Users Guide](#) (updated 8/21/2020)

[Rideshare Accommodation Worksheet Template](#) (updated 10/8/2020)

[Space Communications and Navigation \(SCaN\) Mission Operations and Communications Services \(MOCS\)](#)

[Available Spectrum and Channel Limits By Allocated Service](#)

[System-Level TRL 6 Examples](#)

[Call for Proposals - Senior Review 2020 for Extension of Earth Science Operating Missions](#)

[Directive on Project Applications Program](#)



Questions

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All questions regarding the EVM-3 AO MUST be addressed to:

Ken Jucks, Ph.D.
Earth Venture Mission - 3 Program Scientist
Earth Science Division
Science Mission Directorate
NASA Headquarters
Washington, DC 20546-0001

Preferably by email at:
kenneth.w.jucks@nasa.gov
Subject line to read "EVM-3 AO"